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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/711,509 | 09/23/2004 | Fang-Chen Luo | 12405-US-PA-0P | 5508 |
| 31561 | 7590 | 08/03/2005 | EXAMINER | |
| JIANQ CHYUN INTELLECTUAL PROPERTY OFFICE 7 FLOOR-1, NO. 100 ROOSEVELT ROAD, SECTION 2 TAIPEI, 100 TAIWAN | | | BREWSTER, WILLIAM M | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2823 | |

DATE MAILED: 08/03/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/711,509

Applicant(s)

LUO ET AL.

Examiner

William M. Brewster

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 and 19-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 and 19-27 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 30 June 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings were received on 30 June 2005. These drawings are acceptable for examination.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 2, 8-10, 20, 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Lee et al., US Patent No. 6,737,305 B2.

Lee anticipates a manufacturing method of a thin film transistor (TFT), comprising:
col. 4, line 54 - col. 5, line 61, in fig. 4A, forming a gate 102 over a substrate 100;
in fig. 4B, forming an inter-gate dielectric layer 104 over the substrate covering the gate;
in fig. 4C, forming a channel layer 106 over a portion of the inter-gate dielectric layer at least over the gate, wherein the channel layer is or comprises a lightly doped amorphous silicon layer, col. 5, lines 4-18; and

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in fig. 4E, forming source/drain regions 108 over the channel layer, wherein the source/drain regions are separated by a distance;

limitations from claim 19, further comprising a step of forming, in fig. 4E an ohmic contact layer (not shown, but described) over the channel layer, col. 5, lines 25-32;

limitations from claims 2, 20, the manufacturing method of claim 1, wherein the channel layer comprises an N-type lightly doped amorphous silicon layer, col. 5, lines 4-18;

limitations from claims 8, 25, the manufacturing method of claim 1, wherein the step of forming the channel layer comprises:

in fig. 4C, forming a first lightly doped sub-amorphous silicon layer 106A over the portion of the inter-gate dielectric layer at a first deposition rate (LDR, low deposition rate); and forming a second lightly doped sub-amorphous silicon layer 106B over the first lightly doped sub-amorphous silicon layer at a second deposition rate, (HDR, high deposition rate), wherein the first deposition rate is lower than the second deposition rate, col. 5, lines 4-18;

limitations from claim 9, the manufacturing method of claim 1, further comprising a step of forming, in fig. 4E an ohmic contact layer (not shown, but described) over the channel layer between the step of forming the channel layer and the step of forming the source/drain regions 108, col. 5, lines 25-32;

limitations from claim 10, the manufacturing method of claim 1, further comprising a step of forming, in fig. 4F, a protection layer 110 over the substrate

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after the step of forming the source/drain regions covering the source/drain regions, the channel layer and the inter-gate dielectric layer, col. 5, lines 33-38. limitations from claims 6 and 7, the manufacturing method of claim 1; wherein the step of forming the channel layer comprises performing a chemical vapor deposition (CVD) process using a reaction gas mixture comprising a silane (SiH_4), hydrogen (H_2), col. 5, lines 55-61.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3-7, 21-24, 26, 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee as applied to claims 1, 2, 8-10 above, and further in view of Yang et al., US Publication No. 2002/0102781 A1.

Lee does not specify using phosphine or boroethane, but Yang does. Yang teaches doping the amorphous silicon channel layer of the TFT with phosphine for an n-type TFT or boroethane for a p-type TFT, p. 2, ¶ 25;

and limitations from claim 24, in fig. 2E, further comprising a step of forming a protection layer 164, over the substrate after the step of forming the source/drain

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regions 156, 162, covering the source/drain regions, the channel layer and the inner-gate dielectric layer, p. 3, ¶ 4.

It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Yang's process with Lee's invention would have been beneficial because the well-known industry dopants are readily available and cost effective.

Neither Lee nor Yang specify for claims 4, 5, 22, 23, the concentration of the dopants, or claims 6, 7, 26, 27, the ratio of the reactants. However, the practitioner may optimize these ranges:

"Normally, it is to be expected that a change in temperature, or in concentration, or in both, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art . . . such ranges are termed 'critical ranges' and the applicant has the burden of proving such criticality . . . More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation."

In re Aller 105 USPQ 233, 255 (CCPA 1955). See also In re Waite 77 USPQ 586 (CCPA 1948); In re Scherl 70 USPQ 204 (CCPA 1946); In re Irmischer 66 USPQ 314 (CCPA 1945); In re Norman 66 USPQ 308 (CCPA 1945); In re Swenson 56 USPQ 372 (CCPA 1942); In re Sola 25 USPQ 433 (CCPA 1935); In re Dreyfus 24 USPQ 52 (CCPA 1934).

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where

patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Whereas the doping concentrations maybe optimized by the practitioner, the claimed ranges are already well within the industry standard. Proffered as evidence only is Lee et al., US Publication No. 2004/0046171 A1. Lee (171) in figs. 4F and 4G, the active layer 41 is an amorphous silicon above substrate 40, and contains either phosphorus doping in the range of $1 \times 10^{11} \sim 1 \times 10^{22}$ ions/cm³ or boron doping in the range of $1 \times 10^{11} \sim 1 \times 10^{22}$ ions/cm³. As such 'lightly doped' is contained within a standard doping concentration.

Response to Arguments

Applicant's arguments filed 30 June 2005 have been fully considered but they are not persuasive. Applicant argues in Remarks section, pp. 7-8 that Lee (305) does not anticipate the all the limitations of the independent claims, specifically, the 'lightly doped' silicon layer for the channel.

Examiner respectfully disagrees. As a reminder, the USPTO tasks examiner's with an unwaivable duty interpret claims as broadly as possible (see below). As such 'lightly doped' may be characterized as a term subjective to the user. Further, applicants have not indicated the criticality of any specific range or unexpected results. Lee (305) does not specify ranges leaving the practitioner to optimize the ranges for her

specific instantiation (see In re Woodruff above). Finally, even if applicant could persuade the USPTO that 'lightly doped' has a specified range, the ranges, as proffered in evidence by Lee (171) above, channel layer amorphous silicon for TFT's may contain doping in the range of $1 \times 10^{11} \sim 1 \times 10^{22}$ ions/cm³ as a matter of course, encompassing the ranges claimed by applicant with range of 10 orders of magnitude leeway.

Examiner must give claims their broadest reasonable interpretation, MPEP §2111, "During patent examination, the pending claims must be 'given the broadest reasonable interpretation consistent with the specification.' Applicant always has the opportunity to amend the claims during prosecution and broad interpretation by the examiner reduces the possibility that the claim, once issued, will be interpreted more broadly than is justified, *In re Pratter*, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-51 (CCPA 1969), *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997)." Also see *In re Zletz*, 13 USPQ 2d. 1320 (Fed. Cir. 1989).

For the above reasons, the rejection is deemed proper.

Conclusion

For claims 1-10:

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

For claims 19-27:

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William M. Brewster whose telephone number is 571-272-1854. The examiner can normally be reached on Full Time.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

William M. Brewster

29 July 2005

WB